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# Reducing the impact of preterm birth: Preterm birth commissioning in the United Kingdom

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ABSTRACT

Reducing preterm birth is a priority for Maternity and Children's services. In the recent UK Department of Health publication 'Safer Maternity Care' the Secretary of State for Health aimed to achieve the national maternity safety ambition by pledging to reduce the rate of preterm birth from 8% to 6%. It was proposed that specialist preterm birth services should be established in the UK in order to achieve this aim. In response the Preterm Clinical Network has written Commissioning Guidance aimed to establish best practice pathways and agreed models of care to reduce variation nationally. They have been developed by clinical experts in the field, from within the UK, to provide recommendations for commissioning groups and to recommend pathways to organisations with the aim of reducing the incidence of preterm birth. Three key areas of care provision are focused on: prediction, prevention and preparation of women at high risk of PTB. This Expert Opinion, will summarise the Commissioning Guidance.


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## Background

Preterm birth (PTB), defined as delivery at less than $37^{+0}$ weeks gestation, is a common complication of pregnancy, comprising around 8% of births in England and Wales [1]. It is the most important single determinant of adverse infant outcome with regards to survival and quality of life [2]. Babies born preterm have high rates of early, late, and post-neonatal mortality and morbidity. PTB is estimated to cost health services in England and Wales £3.4bn per year [1].

Reducing preterm birth is a priority for Maternity and Children's services. In the recent Department of Health publication *Safer Maternity Care* the Secretary of State for Health aimed to achieve the national maternity safety ambition by pledging to reduce the rate of preterm birth from 8% to 6%. He proposed that specialist preterm birth services across the country could provide a mechanism through which change could be focused and delivered [3]. In response, the NHS England Saving Babies' Lives Care Bundle Element 5 is specific to preterm birth prevention and will reference guidelines for commissioners and providers, which are summarised in this commentary.

The guidelines also align with the NHS' Long Term Plan which emphasises the need to focus on pre-term mortality and preterm birth prevention and supports the development of specialised preterm birth services across the UK [4]. They aim to establish best practice pathways and agreed models of care to reduce variation nationally. They have been developed by clinical experts in the field, from the UK, to provide recommendations for commissioning groups and to recommend pathways to organisations with the aim of reducing the incidence of preterm birth.

Three key areas of care provision are focused on: prediction, prevention and preparation of women at high risk of PTB. Sources of funding and ways of evaluating implementation and performance are also outlined.

## Prevention

All acute maternity units should offer basic measures to identify and manage the care of women at high risk of PTB, with specialised input from more experienced practitioners within each Local Maternity System to provide services such as high vaginal or transabdominal cerclage. The NHS Long Term Plan supports the development of specialist preterm birth clinics across England [4] with a commitment to fully implement the Saving Babies Lives Care Bundle in 2020. To this end implementation of the Care Bundle has been included in the planning guidance and incorporated into the standard contract for 2019/20.

Strategies to prevent PTB should include establishment of standard care pathways for high-risk women, facilitation of access to specialised care in every maternity unit, establishment of a preterm birth network to encourage research and facilitation of large datasets of patient information (with patient consent) to improve management and treatment of high-risk women.

### *Identification of at-risk women*

#### *Community care*

Correct identification of women at high risk of preterm birth facilitates interventions which have been shown to be beneficial either in prolongation of pregnancy or in reducing subsequent neonatal morbidity and mortality.

At the booking visit women should be screened for factors known to be associated with PTB e.g. smoking and substance use, domestic violence, and urinary tract infection and appropriate support/treatment given.

Low, intermediate, or high-risk care can then be offered as outlined below. Referral criteria can be seen in Table 1.

#### *Hospital-based care*

There should be provision for designated preterm prevention specialists (PPS) in every maternity unit to provide an outpatient service within their antenatal clinic for women referred for screening. This should be able to accurately quantify risk using transvaginal ultrasound measurement of cervical length (CL) and appropriate predictive biomarkers such as quantitative fibronectin (qfFN) for asymptomatic high-risk women and provide timely interventions for preterm birth prevention (such as cerclage, progesterone, pessary).

Preterm prevention teams in more experienced units should be contacted to assess women with complex obstetric and medical histories, and have the facilities to provide high vaginal and transabdominal cerclage where appropriate.

Ultrasound cervical length screening should be performed as a minimum at 16 and 22 weeks in women identified at high risk, and outside of this window and/or more frequently where indicated. Those at intermediate risk should have at least one CL assessment between 18 and 22 weeks, with referral to the local PPS team if the CL is <25 mm. If the CL is $\geq$ 25 mm they may return to a low-risk pathway. In asymptomatic women there is usually no need to routinely carry out CL assessments beyond 26 weeks.

Cervicovaginal quantitative fetal fibronectin may be used in high risk asymptomatic women from 18 weeks gestation [5]. Preterm surveillance clinics have been shown to have significant ability in triaging women at high risk of preterm delivery [6].

## Prevention

Several interventions have been assessed for women at high risk of preterm birth: cervical cerclage, progesterone and pessaries. Precisely in which women, and in what circumstances, each is most helpful is not clear but are currently being investigated in randomized control trials such as the SUPPORT study which is comparing the three techniques [7].

### *Cervical cerclage*

Women with a history of recurrent spontaneous preterm birth or late miscarriage (16–34 weeks) may be offered a history-indicated cervical cerclage. Transvaginal CL scan assessment of the cervix within the second trimester can be recommended as an alternative and is suitable for most women who have had a single episode [8]. History-indicated cerclages should be placed by the end of the first trimester where possible.

In women who have had a failed transvaginal cerclage with delivery or preterm premature rupture of membranes (PPROM) before 28 weeks of gestation, a transabdominal cerclage may be considered [9]. Placement may be pre-conception but can be performed during pregnancy (<14 weeks). All Trusts should identify two or three clinicians to specialise in transvaginal cervical cerclage to enable sufficient capacity for 52-week cover.

**Table 1**
Risk factors associated with preterm birth and recommended referral pathways for preterm prevention surveillance.

| Risk factor | Pathway |
|---|---|
| **High risk** | **Surveillance** |
| • Previous preterm birth or mid-trimester loss (16 to 34 weeks gestation)<br>• Previous preterm prelabour rupture of membranes <34/40<br>• Previous use of cervical cerclage<br>• Known uterine variant (i.e. unicornuate, bicornuate uterus or uterine septum)<br>• Intrauterine adhesions (Ashermann's syndrome)<br>• History of trachelectomy (for cervical cancer) | 1 Referral to local or tertiary Preterm Prevention (PP) service by 12 weeks.<br>2 Further risk assessment based on history +/- examination as appropriate in secondary care with identification of women needing referral to tertiary services.<br>3 All women to be offered transvaginal cervix scanning as a secondary screening test to more accurately quantify risk at least twice (usually 2-4 weekly) between 16 and 24 weeks.<br>4 Additional use of quantitative fetal fibronectin in asymptomatic women may be considered where centres have this expertise.<br>**Management**<br>5 Interventions should be offered to women as appropriate, based on either history or additional screening tests by clinicians able to discuss the relevant risks and benefits according to up to date evidence and relevant guidance, for example Preterm Clinical Network guidance and NICE guidance. These interventions should include cervical cerclage, pessary and progesterone as appropriate. |
| **Intermediate risk** | **Surveillance** |
| • Previous delivery by caesarean section at full dilatation<br>• History of significant cervical excisional event i.e. LLETZ where >10 mm depth removed, or >1 LLETZ procedure carried out or cone biopsy (knife or laser, typically carried out under general anaesthetic) | 1) Refer to preterm birth prevention service by 12 weeks.<br>2) Further risk assessment based on history +/- examination as appropriate in secondary care with discussion of the option of additional screening tests, including:<br>a) A single transvaginal cervix scan between 18-22 weeks as a minimum.<br>b) Additional use of quantitative fetal fibronectin in asymptomatic women can be considered where centres have this expertise<br>**Management**<br>1) Interventions should be discussed with women as appropriate based on either history or additional screening tests by clinicians able to discuss the relevant risks and benefits according to up to date evidence and relevant guidance. These interventions should include cervical cerclage, pessary and progesterone as appropriate.<br>2) Women at intermediate risk should be reassessed at 24 weeks for consideration of transfer back to a low risk pathway. |

*Progesterone*

As an alternative to prophylactic cervical cerclage, women who have had a history of spontaneous preterm birth or mid-trimester loss between 16 + 0 and 34 + 0 weeks of pregnancy and in whom CL <25 mm may be offered prophylactic progesterone [1]. It may also be offered when the CL <25 mm between 16 + 0 and 26 + 0 in women with no history of spontaneous preterm birth or midtrimester loss [1].

*Pessary*

Arabin pessaries have been also used as an alternative to prophylactic cervical cerclage or progesterone in women who have had a history of spontaneous preterm birth or mid-trimester loss between 16 + 0 and 34 + 0 weeks with a cervix <25 mm. As with the other preventive modalities ongoing studies will help define which women will most benefit from pessary use.

## Preparation

Symptomatic women should be assessed to stratify risk of those at risk of imminent delivery to appropriately implement interventions to reduce neonatal morbidity and mortality.

Predictive tests can be used in accordance with NICE guidance [1] where the woman is suspected to be in preterm labour and is >30 weeks. These tests include ultrasound measurement of CL (when < 15 mm she is deemed to be at high risk of preterm birth) and use of quantitative fetal fibronectin where CL measurement is not available.

Each of these tests has high negative predictive values related to the low prevalence. The positive predictive value is lower but sufficient to allow intervention. The role of quantitative testing and its use in clinical care (in conjunction with the use of algorithms deployed in the QUIPP app [10]) remains encouraging and may assist individualised consultation with parents.

Following confirmation of at-risk status, the following interventions are recommended:

*Corticosteroids*

Where PPROM has occurred, or when women in suspected or established labour, corticosteroids should be considered from 23 + 0–35 + 6 weeks gestation (and offered between 26 + 0 and 33 + 6) [1]. A reduction in neonatal mortality, respiratory distress, intra-ventricular haemorrhage and pulmonary complications is conferred.

The importance of timing and appropriate administration has recently been highlighted. Even a single steroid dose is associated with a reduction in birthweight in those infants who delivered after one week of administration compared with placebo [11] and unnecessary intervention should be avoided.

In the event of inappropriate administration (ie without delivery <7 days) a further course of steroids can be considered where the first dose has been given early in gestation and delivery has not occurred, as it results in a reduction in respiratory distress syndrome compared with placebo.

*Magnesium sulphate*

Magnesium sulphate should be offered between 24 + 0 and 29 + 6 weeks to women who are in established labour as it will decrease the risk of cerebral palsy [1]. Its use may also be considered up to 33 + 6

weeks [12]. The PReCePT initiative is an AHSN-driven strategy seeking to adopt best practice in this regard [13].

*Tocolysis*

The use of tocolysis is not recommended for women at risk of imminent preterm birth to improve neonatal outcomes unless short-term delay is desirable i.e. for *in utero* transfer. There is no evidence that maintenance tocolysis is beneficial.

*In utero transfer*

Transfer of a mother with her baby *in utero* ensures that she is in the right facility to receive the appropriate obstetric and neonatal care. There is a reduced incidence of intra-ventricular haemorrhage in very low birthweight babies when transfer is *in utero* comparison with *ex utero*, as well as lower neonatal mortality and costs [14].

It is now a prioritised NHS England recommendation for Local Maternity Systems (LMS) to take action to ensure that all women <27 weeks are delivered in centres with a neonatal intensive care unit, and that LMS and corresponding Operational Delivery Networks (ODN) have clear guidelines for antenatal transfer in the event of impending delivery <27 weeks [15]

## Post pregnancy care

Follow up pathways for all women who have undergone a PTB < 34 weeks should be in place. A postnatal consultation by the local obstetric team should be offered to enable debriefing, planning care for future pregnancies, including discussion about optimizing health preconception through improvements in diet and weight loss, stopping smoking and periconceptual folic acid [16]. If there is recurrent PTB or a more complex history, referral to a more experienced preterm prevention specialist is recommended.

Placental histology, undertaken by a perinatal pathologist, should be routine for all deliveries < 34 weeks gestation to assess for signs of infection/inflammation or ischaemia/infarction and other pathologies associated with placental insufficiency according to the Amsterdam criteria [17].

Women with a history of extreme preterm birth (<28 weeks) despite the placement of a transvaginal cervical cerclage should be counselled about the option of placing an abdominal cervical cerclage either before or during the next pregnancy, to reduce the risk of PTB.

## Funding considerations

Funding to improve prevention or optimise the management of preterm birth exists within the current maternity payment pathway. Women deemed to be at risk of preterm birth and requiring specialist care access the intermediate rate tariff, £700 above the standard tariff. In a typical setting of a unit overseeing 5000 deliveries each year, around 400 women are likely to be identified as being at-risk, and funds of between £25-30k thereby available to provide the necessary infrastructure costs. Day case or overnight surgical procedures for cerclage insertion can be covered under early pregnancy/gynaecology tariffs.

From the national perspective, cost analyses show that if preterm birth can be deferred by one week of gestation, annual savings to the NHS of £994 million will be made [18].

## Conclusions and recommendations

The standardisation of preterm birth services and establishment of care pathways to identify and manage women at high risk of PTB is imperative to reduce the preterm birth rate in the UK and its associated morbidity and mortality. It is hoped that the implementation of these guidelines will result in a reduction of this burden.

## Disclosures of interest

ALD has received an honorarium from Hologic Inc. to present at 2018 British Maternal Fetal Medicine conference about screening and prediction of preterm birth. She has also been an unpaid member of the Hologic Inc. UK Perinatal Advisory Board since November 2017. AS is chief investigator on a number of trials funded by NIHR and charity sources related to preterm birth prediction and prevention. Hologic, Biomedical and Qiagen have provided samples for these studies. Hologic have provided funding (paid to institution) to evaluate technical performance of their samples. PRB acts as a consultant for ObsEva, a pharmaceutical company developing drugs to prevent preterm birth, and Samsung, a medical imaging company developing diagnostics for preterm labour.

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## References

[1] National institute of clinical excellence. Preterm labour and birth NG 25. 2015.
[2] Saigal S, Doyle LW. An overview of mortality and sequelae of preterm birth from infancy to adulthood. Lancet 2008;371:261–9.
[3] DoHaS Care. Safer maternity care: next steps towards the national maternity ambition. 2016.
[4] The NHS longterm plan. 2019. . January https://www.longtermplan.nhs.uk/wp-content/uploads/2019/01/nhs-long-term-plan.pdf.
[5] Bolt LA, Chandiramani M, De Greeff A, Seed PT, Kurtzman J, Shennan AH. The value of combined cervical length measurement and fetal fibronectin testing to predict spontaneous preterm birth in asymptomatic high-risk women. J Matern Fetal Neonatal Med 2011;24:928–32.
[6] Min J, Watson HA, Hezelgrave NL, Seed PT, Shennan AH. Ability of a preterm surveillance clinic to triage risk of preterm birth: a prospective cohort study. Ultrasound Obstet Gynecol 2016;48:38–42.
[7] Hezelgrave NL, Watson HA, Ridout A, Diab F, Seed PT, Chin-Smith E, et al. Rationale and design of SuPPoRT: a multi-centre randomised controlled trial to compare three treatments: cervical cerclage, cervical pessary and vaginal progesterone, for the prevention of preterm birth in women who develop a short cervix. BMC Pregnancy Childbirth 2016;16:358.
[8] Vousden N, Hezelgrave N, Carter J, Seed PT, Shennan AH. Prior ultrasound-indicated cerclage: how should we manage the next pregnancy? Eur J Obstet Gynecol Reprod Biol 2015;188:129–32.
[9] Carter JC, Seed M, Shennan P, A.H, the MAVRIC Consortium. MAVRIC: multicentre abdominal vs vaginal randomised investigation of cerclage. Br J Obstet Gynaecol 2015;122:1–7 (abstract full article submitted PLOS Medicine).
[10] Kuhrt K, Hezelgrave N, Foster C, Seed PT, Shennan AH. Development and validation of a tool incorporating quantitative fetal fibronectin to predict spontaneous preterm birth in symptomatic women. Ultrasound Obstet Gynecol 2016;47:210–6.
[11] Crowther CA, McKinlay CJ, Middleton P, Harding JE. Repeat doses of prenatal corticosteroids for women at risk of preterm birth for improving neonatal health outcomes. Cochrane Database Syst Rev 2015CD003935.
[12] Chang E. Preterm birth and the role of neuroprotection. BMJ 2015;350:g6661.
[13] Network A. PReCePT: Reducing cerebral palsy through improving uptake of magnesium sulphate in preterm deliveries.
[14] Mistry H, Dowie R, Franklin RC, Jani BR. Costs of neonatal care for low-birthweight babies in English hospitals. Acta Paediatr 2009;98:1123–9.
[15] England N. Implementing better births. Resource Pack for Maternity Systems. 2017.
[16] Stephenson J, Heslehurst N, Hall J, Schoenaker D, Hutchinson J, Cade JE, et al. Before the beginning: nutrition and lifestyle in the preconception period and its importance for future health. Lancet 2018;391:1830–41.
[17] Khong TY, Mooney EE, Ariel I, Balmus NC, Boyd TK, Brundler MA, et al. Sampling and definitions of placental lesions: amsterdam placental workshop group consensus statement. Arch Pathol Lab Med 2016;140:698–713.
[18] Mangham LJ, Petrou S, Doyle LW, Draper ES, Marlow N. The cost of preterm birth throughout childhood in England and Wales. Pediatrics 2009;123:e312–27.